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THE GREEN-BUG OR SPRING GRAIN-APHIS:

HOW TO PREVENT ITS PERIODICAL OUTBREAKS

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Destroy volunteer grains during summer and early fall.

THE GREEN-BUG OR SPRING GRAIN-APHIS: HOW TO PREVENT ITS PERIODICAL OUTBREAKS.

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DISTRIBUTION.

THE GREEN-BUG (fig. 1) is a small, soft-bodied aphid or plant-louse which is distributed throughout nearly the entire United States and extends into Canada (fig. 2). Its injuries prin-

FIG. 1.—The spring grain-aphis: Wingless viviparous female. Enlarged; actual size, 2 mm. (Webster and Phillips.)

cipally are inflicted throughout the Mississippi Basin, where it often has been responsible for many millions of dollars' worth of damage to the small grains. It is estimated to have caused in one

year (1907) a loss of not less than 50,000,000 bushels of oats and wheat in Kansas, Oklahoma, and Texas. Seventy per cent of the wheat acreage in Texas was abandoned that year because of the ravages of this formidable pest.

Smaller outbreaks occurred in 1911 and 1916 and outbreaks will continue to occur in the future unless growers generally adopt the control measures described in this bulletin. This statement applies especially to Texas, Oklahoma, Kansas, and Missouri, where the pest is present in greater or less numbers almost constantly and requires merely the advent of favorable conditions to become the agent of disaster to the wheat and oats crops.

FIG. 2.—Map showing the known distribution of the spring grain-aphis in the United States and Canada. (Webster and Phillips.)

While the green-bug can exist to some extent on a wide variety of grass-like plants, including most of the small grains, it is injurious principally to oats and wheat. For this reason these plants must be considered as its favorite hosts and should receive the closest of attention in all control methods which may be adopted.

Outbreaks of the green-bug may be expected in the lower Mississippi Basin States during the early spring, following a mild winter, especially should the spring prove to be a cool, backward one. This is due to the ability of the pest to multiply constantly at comparatively low temperatures, under which its controlling agencies are dormant.

LIFE HISTORY.

The life history of the green-bug is a peculiarly complicated one and for this reason will not be described in detail in this brief,

popular publication. There are no less than three distinct forms of adult females of the pest. A wingless one, producing its young alive (fig. 1); a wingless one, which lays eggs (fig. 3); and a fully winged one (fig. 4), producing its young alive. The male is of small importance, as ordinarily he is not required in the multiplication of the species.

In the southern latitudes the egg-laying females are not believed to exist, but both the other forms of females which produce living young are found at certain seasons. The wingless form of this type is practically always present and producing young all the year round. The egg-laying females appear in the north only in the

FIG. 3.—The spring grain-aphis: Oviparous female, showing eggs within the abdomen. Enlarged; actual size, 2.25 mm. (Webster and Phillips.)

fall of the year and the insect may pass the winter either in the egg stage or as active nymphs or adults on the lower parts of its food plants.

South of the thirty-fifth parallel this pest (except in high altitudes) appears to breed continuously throughout the year, and for this reason is most dangerous to the wheat and oats crops of these warmer regions.

The egg (fig. 5) of the green-bug is green when freshly laid, but soon becomes shiny black, and is to be found attached to the food plants of the pest. These eggs are deposited in the fall and do not hatch until the following spring. The young bugs (fig. 6), upon

FIG. 4.—The spring grain-aphis: Winged viviparous female and antenna. Enlarged; actual size, 1.9 mm. (Webster and Phillips.)

hatching, are green with black feet, and begin to suck the sap from the grain almost immediately. The same is true regarding those born alive, as within a very short time they are to be found busily engaged in securing their nourishment from the wheat or oat plants at the expense of the grower.

The bugs do not change materially in color throughout their lives and the figures show the appearance of the various stages of the insect. As it requires only from 6 to 7 days for the young green-bug to become adult and begin to produce its young, the pest is able to multiply enormously during the most favorable season of the year and with most dangerous rapidity. It may have at least 20 generations a year in the latitude of Richmond, Ind., and even more in its favorite abode in Texas. A single female may produce from one to eight young per day for periods of at least two or three weeks. Unlike many other insects, the green-bug has no resting stage, and the adult insects are quite as injurious as the young ones, feeding almost continuously from the time they are born until old age overtakes them.

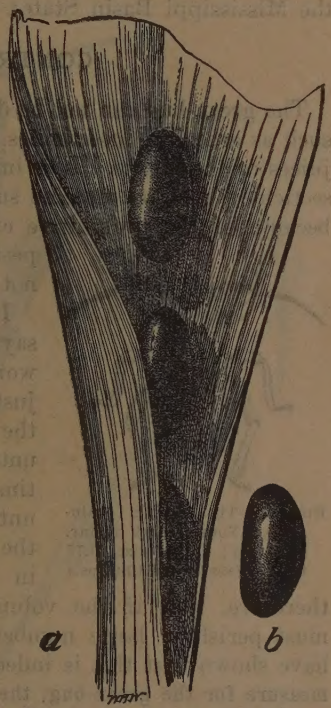

FIG. 5.—The spring grain-aphis: Eggs as deposited on leaf: *a*, Dorsal view; *b*, lateral view. Greatly enlarged. (Webster and Phillips.)

The green-bug secures its food by sucking the sap or juices of the plants upon which it feeds; it takes no solid food of any kind. Its effects upon the grain plants are quickly noticeable, as they appear in the form of yellow areas (fig. 7) on the blades, which turn reddish brown and die. It is probable that this pest in some way poisons the tissues of the plants, although this theory has not been proved.

NATURAL ENEMIES.

The principal reason why the green-bug is not injurious every year is the fact that it is attacked and kept in check by a very small wasp-like parasite (fig. 8). This little friend of the grain grower lays its eggs directly in the bodies of the green-bugs, both young and old, and the maggots hatching from these eggs devour the bugs (fig. 9), destroying them in great numbers. Unfortunately, however, this

parasite is able to work and multiply only during comparatively warm weather, while its host, the green-bug, is not so restricted, but keeps right on breeding unless the winter weather is very severe. For this reason the parasite of the pest can not be depended upon to safeguard the crops, and the grain grower must adopt proper methods of protection if he expects ever to prevent the recurring outbreaks of the pest which have become so notorious throughout the Mississippi Basin States.

CONTROL METHODS.

The green-bug can not be destroyed by means of stomach poisons, such as arsenical insecticides, because it feeds upon nothing but the juices of the plants. It is impracticable to fight it with contact insecticides, such as nicotine sulphate or kerosene emulsion, not only because of the prohibitive expense involved but also because this pest often feeds in positions where it can not be reached with such sprays.

FIG. 6.—The spring grain-aphis: Young, first instar. Enlarged; actual size, 0.75 mm. (Webster and Phillips.)

In the control of the green-bug the old saying that "an ounce of prevention is worth a pound of cure" is most strikingly justified. In the southern half of its range the green-bug is dependent largely on volunteer grain for its existence from the time the crop of the current year is cut until the young grain is above ground in the fall, or even until the following spring in many cases. It naturally follows, therefore, that if the volunteer growth is destroyed the insects must perish in large numbers for want of food, and experiments have shown that this is indeed the case. **The most important control measure for the green-bug, therefore, is the destruction of all volunteer small grain, especially oats and wheat, during the period from midsummer to early fall. This method is of the utmost importance in Texas, Oklahoma, Kansas, and Missouri, where serious outbreaks may originate at any time and sweep northward throughout the wheat-belt States.**

It will not do for merely a few growers to adopt such measures, but they must be put into practice throughout large areas, wherever the green-bug winters in numbers, if satisfactory results are to be expected. The volunteer grain may be disked and plowed down or otherwise destroyed during the period mentioned above and some other short-season crop planted or the land fallowed until the next spring if the blowing or drifting of the soil is not a factor.

Unless grain growers are willing to cooperate and put into effect measures for the destruction of volunteer grain, it will be difficult for

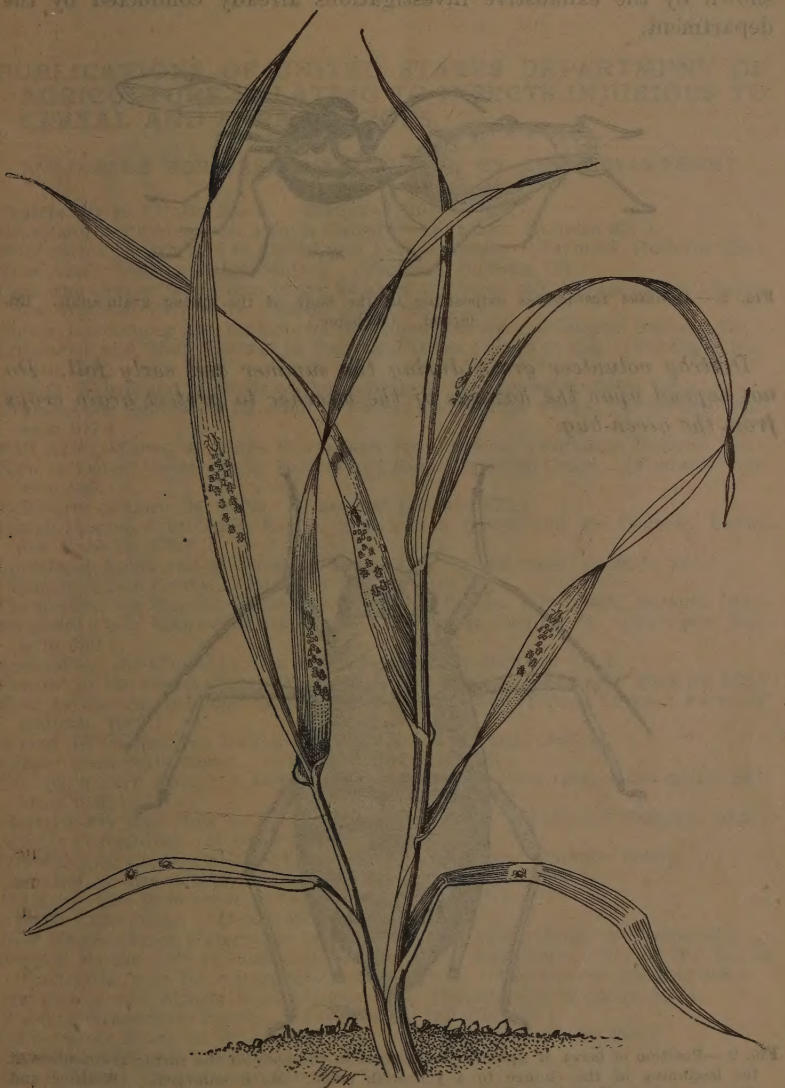

FIG. 7.—The spring grain-aphis (*Toxoptera graminum*): Wheat plant showing winged and wingless viviparous females with their young clustered on the leaves, and a few parasitized individuals on lower leaves. About natural size. (Webster and Phillips.)

the Federal Department of Agriculture to expend further money to best advantage for investigational purposes in connection with the

green-bug problem, because the eradication and control of the pest rests to a very considerable degree with the growers themselves, as is shown by the exhaustive investigations already conducted by the department.

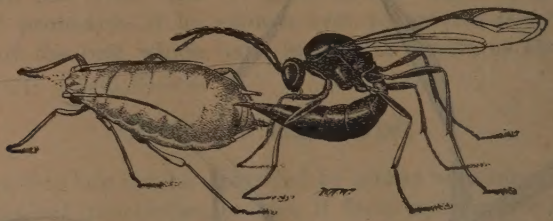

FIG. 8.—*Aphidius testaceipes* ovipositing in the body of the spring grain-aphis. Enlarged. (Webster.)

Destroy volunteer grain during the summer and early fall. Do not depend upon the hazards of the weather to protect grain crops from the green-bug.

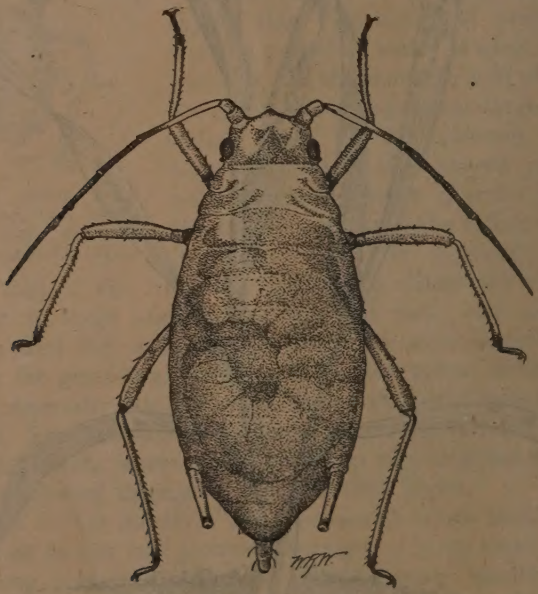

FIG. 9.—Position of larva of *Aphidius testaceipes* in the body of the spring grain-aphis at the beginning of the change to a yellowish color. Much enlarged. (Webster and Phillips.)

Obtain the cooperation of neighboring growers in putting such measures into effect, as individual efforts may be in vain.

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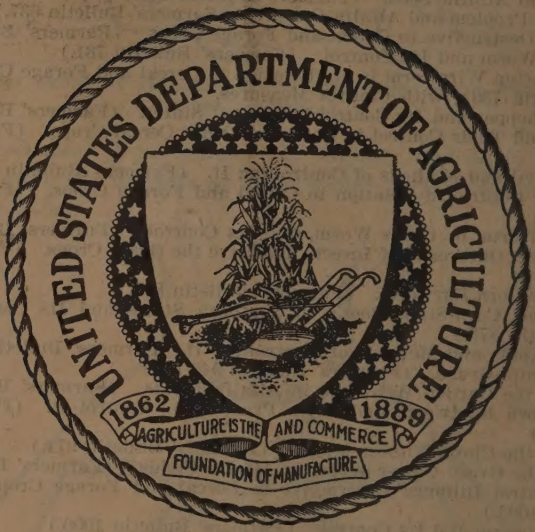
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